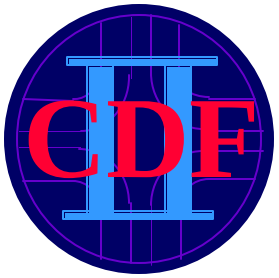


CDF Operations Report

Masa Tanaka

26th-July-2004

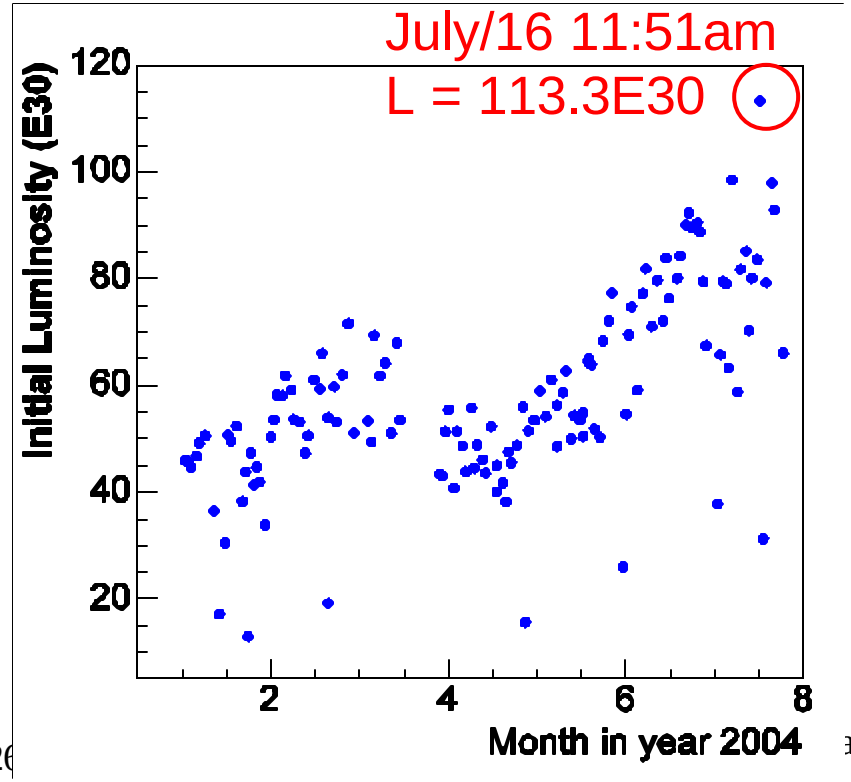
2004 CDF Week

Outline

- Status of CDF operation of this year (Jan, 2004 ~)
- Excluding
  - Accelerator status (Dave McGinnis.)
  - COT status (Kevin Burkett)
  - Silicon status (William Trishuk)
  - Trigger and Dataset (Kevin Pitts)
  - Shutdown Plan (Carl Bromberg)
  - Run II B upgrade (Pat Lukens)
- Today's main objection
  - Data taking efficiency and data quality

Record Luminosity

- Tevatron has achieved L>100E30
  - As promised at Users Meeting
  - Larry has lost his bet!
  - How about the next bet?



Fermilab Today

Calendar

Thursday, July 22

Noon Summer Lecture Series - 1 West
Speaker: V. White, Fermilab
Title: Grid Computing and Physics

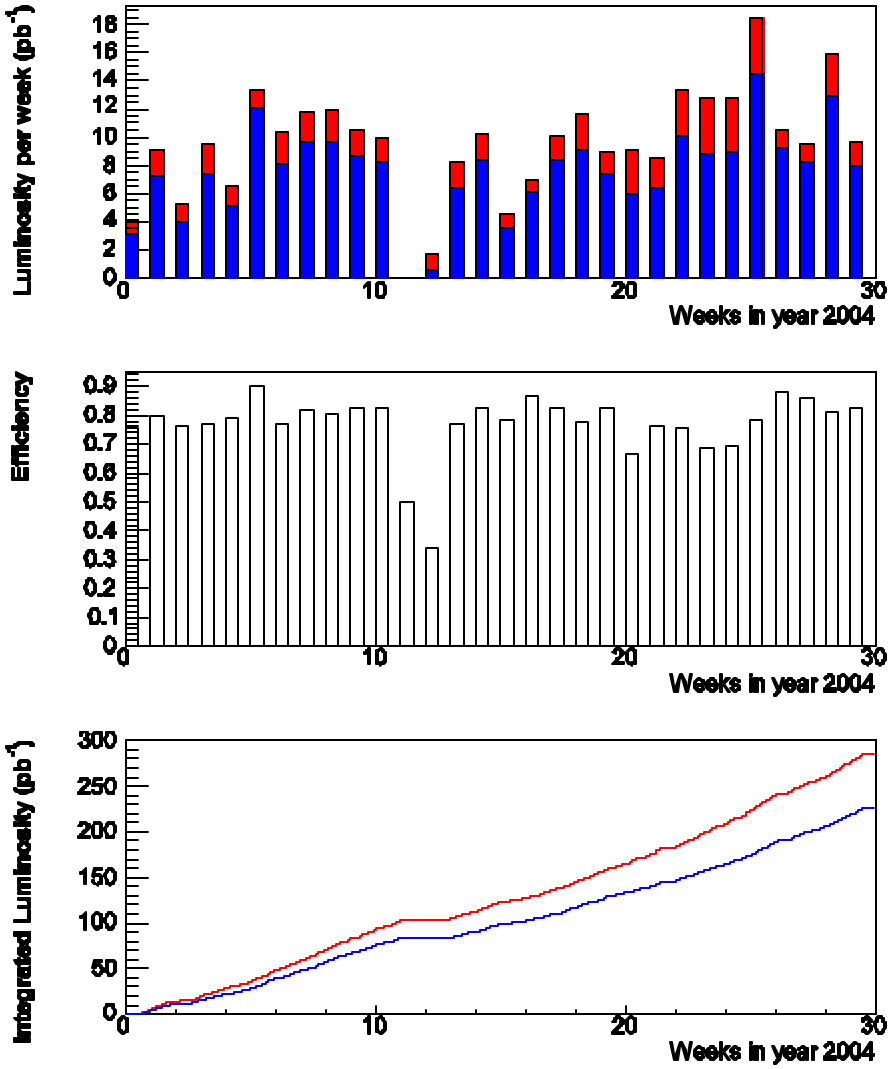
2:30 p.m. Theoretical Physics Seminar - Curia II
Speaker: D. Wackeroth, State University of New York, Buffalo
Title: NLO QCD Predictions for Hadronic Higgs

CDF Brings the Bubbly Stuff to Main Control Room

CDF delivered a case of champagne to the Main Control Room on Tuesday after losing a bet about the recent luminosity record. (Click on image for larger version.)

This Year's Operation

- Record initial luminosity: Jul/16
  - Initial: 113.3 x 10^{30} $cm^{-2}s^{-1}$
  - Integrated: 4.45 pb^{-1}
- Week integrated luminosity
  - Jun/21-28
  - 14.4 pb^{-1} / 18.5 pb^{-1}
  - Rob Harr as Ops Manager
- Week CDF efficiency (Feb/8-15)
  - 12.1 pb^{-1} / 13.4 pb^{-1} = 90.2%
  - JJ as Ops Manager
- Integrated luminosity of the year
  - Jan/1-Jul/23
  - Delivered-Acquired-Good-SVX
  - 285 – 226 -195 -166 pb^{-1}



Shift Record

- Best efficiency with Delivered Luminosity > 1 pb^{-1}

End of Shift Numbers	
CDF Run II	
Runs	184377
Delivered Luminosity	1045.8 nb-1
Acquired Luminosity	999.9 nb-1
Efficiency	95.6

2004 CDF E-Log -- Owl shift. Thu Jun 24, 2004				
SciCo	DAQ Ace	Monitoring Ace	CO	(Operations Manager)
Joe Incandela	Bo Jayatilaka	Matt Hare	Thomas Florian	Rob Harr

  - New Record at yesterday (Jul/25) evening shift !!!
    - Steve K. / Regis L. / Johannes M. /Lucia Z. /JJ
    - 995 nb^{-1} /1039 nb^{-1} = 95.8%
- Largest Live Luminosity per shift

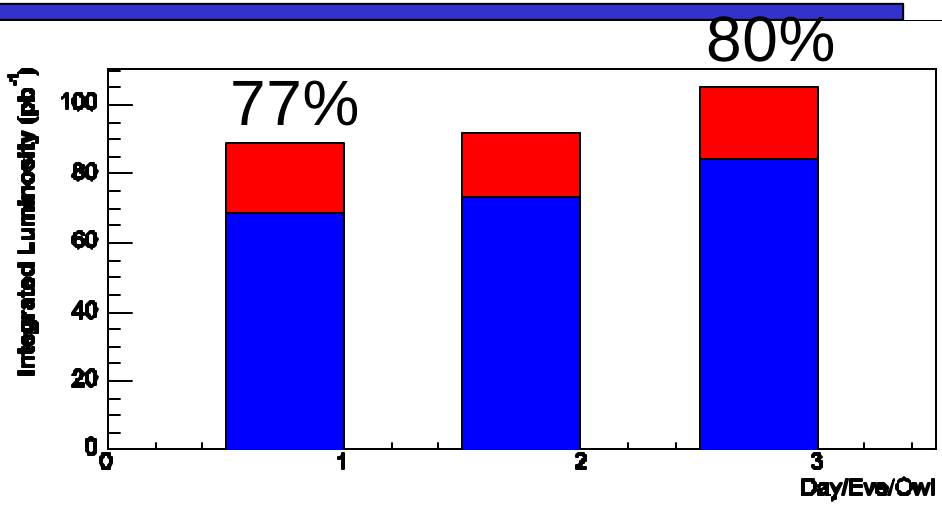
End of Shift Numbers	
CDF Run II	
Runs	185201
Delivered Luminosity	1511.6 nb-1
Acquired Luminosity	1366.1 nb-1
Efficiency	90.4%

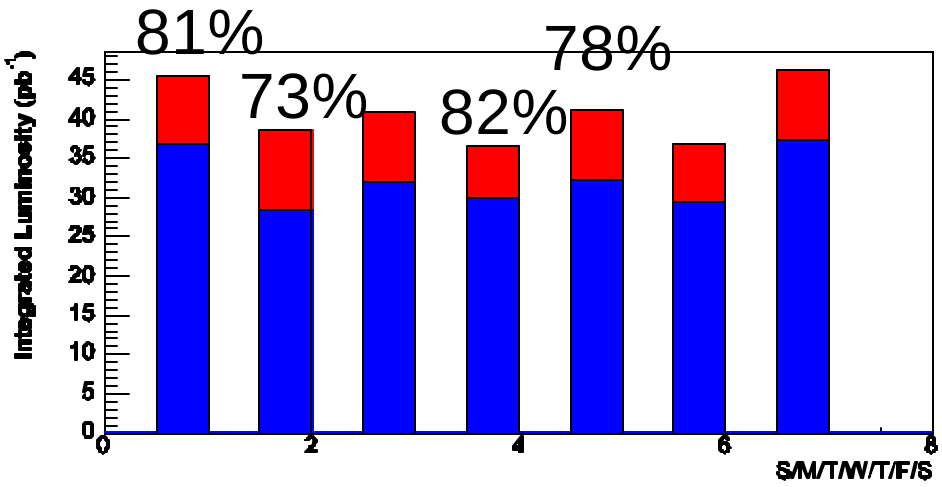
2004 CDF E-Log -- Owl shift. Thu Jul 15, 2004				
SciCo	DAQ Ace	Monitoring Ace	CO	(Operations Manager)
Manfred Paulini	Johannes Muelmenstaedt	Regis Lefevre	Jiyeon Han	Robert Harr

- Hope these records to be broken soon
- Apparently both are Thursday owl shift

Time/Day dependence

- Day shift vs. Owl shift
  - 12% less Delivered luminosity
    - More shot setup in day shift
  - 3% less Efficiency
    - More people in control room
    - Several tests happen in day shift
- Monday vs. Sunday
  - 18% less Delivered luminosity
    - No Tev study in weekend
  - 8% less Efficiency !
    - It's larger effect than I could imagine
    - Experts back to work on Monday
    - We need to do something
  - 2nd worst : Thursday
    - Lots of people in B0 building

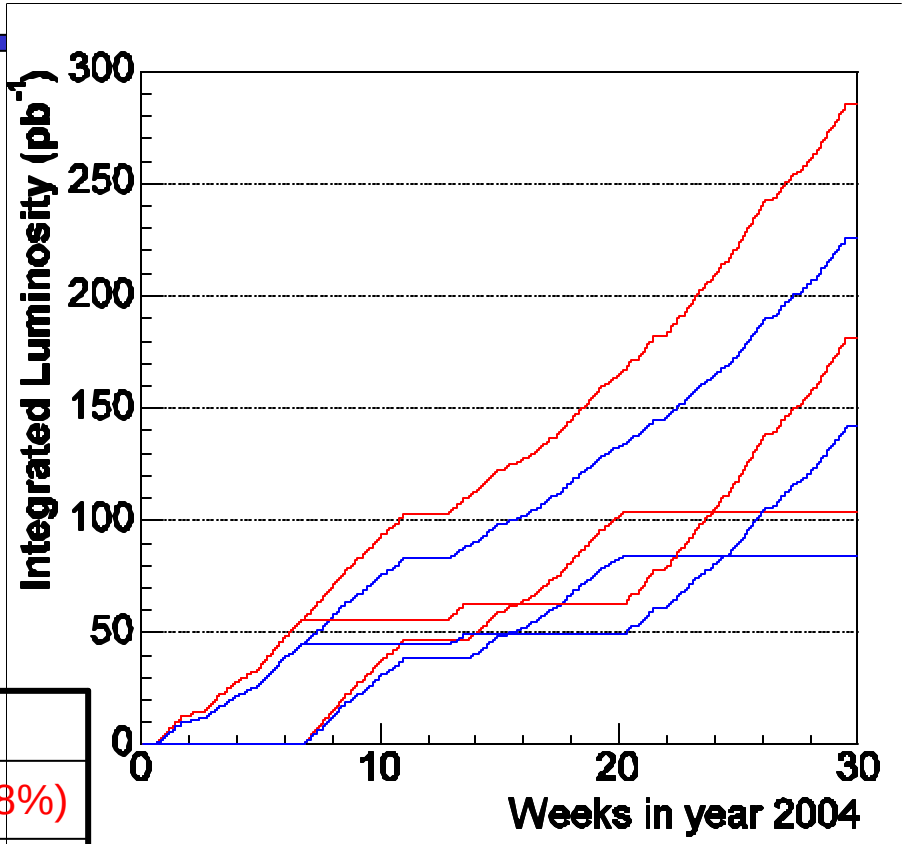




Thanks to Steve Levy for providing tools

COT Compromised Data

- Aging effect observed and resolved
  - See Kevin's talk for details
- Data taken with reduced COT HV
  - Start: Feb/13 (179096)
  - End: May/19 (182843)
- Gain back to summer/2003 level
  - After recirculation and adding O_2
  - ~ Jun/18



pb^{-1}(%)	Deliv	Live	Good	Si
Total	285	226(79%)	195(68%)	166(58%)
Full	178	139(78%)	129(72%)	115(64%)
Comp	107	87(81%)	66(62%)	51(48%)
July	40	36(83%)	34(78%)	33(76%)

CDF Efficiency

Thanks to Bill Budgett for providing tools

Year 2004 ($285pb^{-1}$)

Category	Group	TotalLostLumi pb^{-1}
Beam Loss		**~10**
CDF Downtime		**~30**
EVB	DAQ	2.63
SVX DAQ	DAQ	2.60
TRIGLVL3	TRIGGER	2.47
SVX HV	HV	1.86
SOLENOID	MAGNETS	1.62
TDCs	DAQ	1.51
STARTUP	DAQ	1.37
TRIGLVL2	TRIGGER	1.21
TRIGTABL	TRIGGER	1.18
TRIGLVL1	TRIGGER	1.07
SMXR	DAQ	1.00
Intra-Run DeadTime		**~28.**

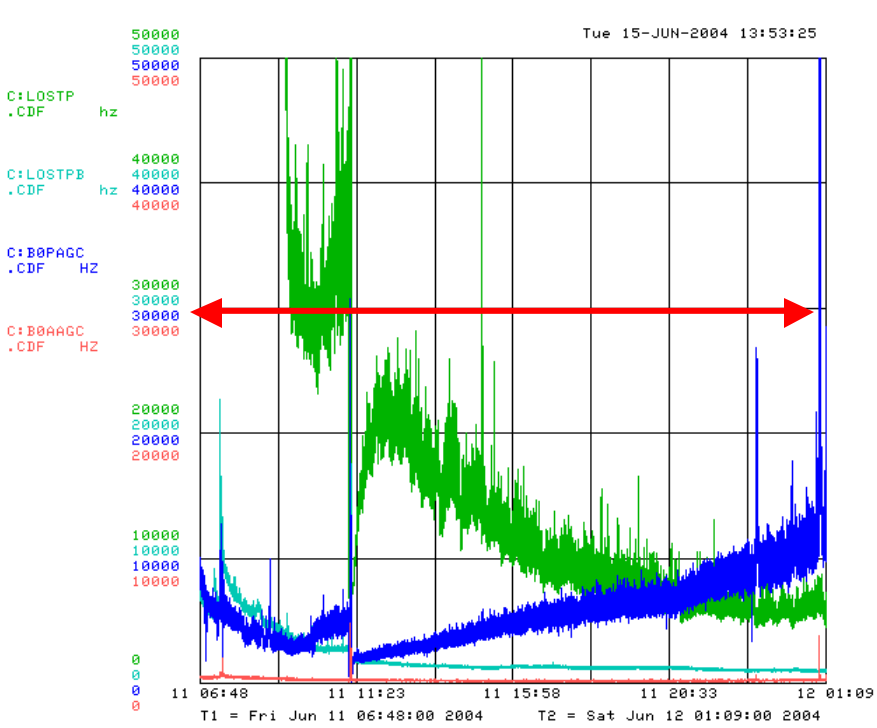
July 2004 ($40pb^{-1}$)

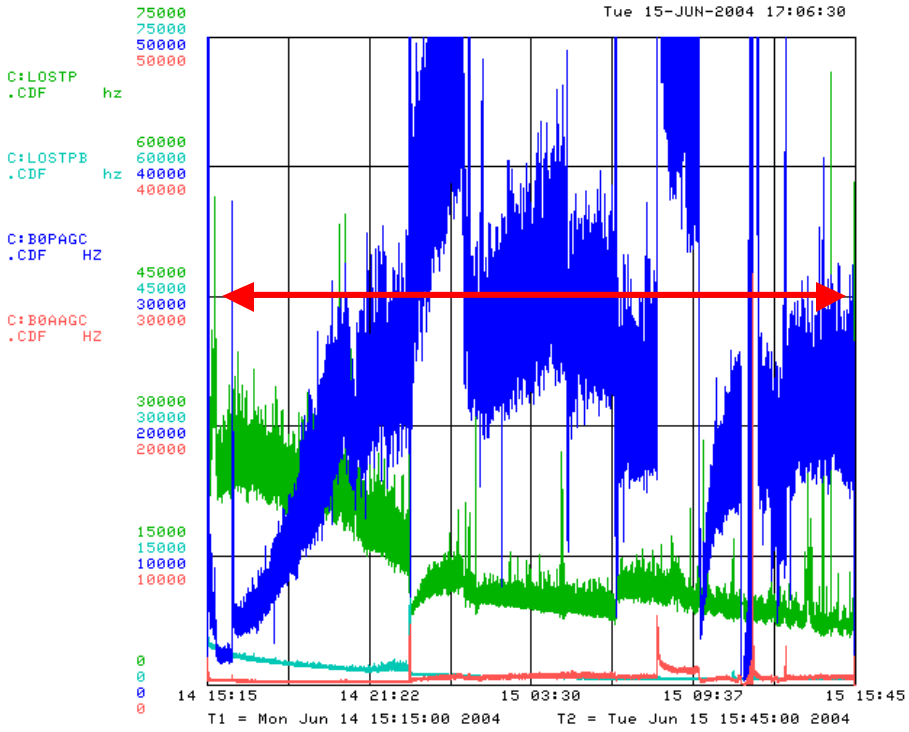
Category	Group	TotalLostLumi, pb^{-1}
Beam Loss		**0.55**
CDF Downtime		**3.8**
SVX DAQ	DAQ	0.351
SVX/ISL HV	HV	0.312
TRIGLVL3	TRIGGER	0.246
TDCs	DAQ	0.228
TRIGSVT	TRIGGER	0.221
SMXR	DAQ	0.198
PCAL HV	HV	0.187
TRIGLVL2	TRIGGER	0.185
TRIGTABL	TRIGGER	0.170
NOCATEG	MISC	0.152
EVB	DAQ	0.127
RUNCNTRL	DAQ	0.106
STARTUP	DAQ	0.101
Intra-Run DeadTime **		**4.2**

- Three main contributions
  - (1) Beam condition
  - (2) Downtime
  - (3) Deadtime
- These numbers are preliminary
  - Inconsistent downtime entries
  - Over wrap between (1),(2), and (3)
  - We are not yet sure the way of counting DAQ deadtime is correct

(1) Beam Losses

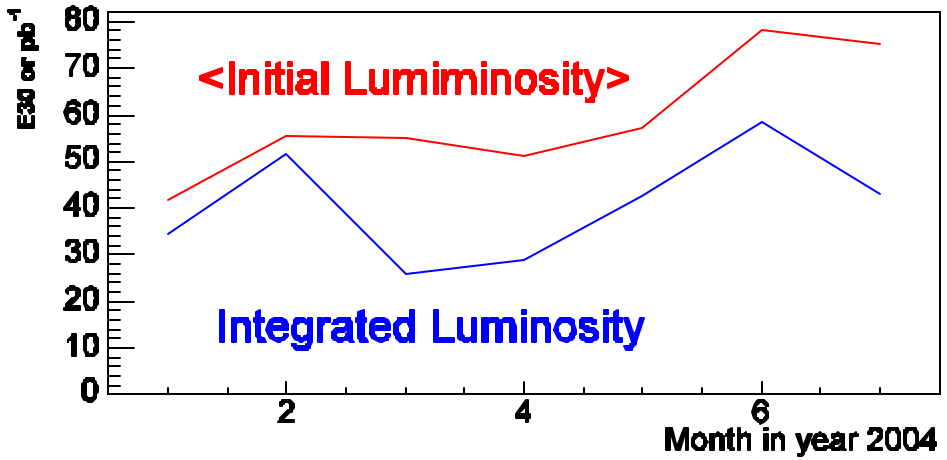
- Proton Losses (All detector)
  - Causes HV trip in detectors
  - High loss: high probability of quench
- Abort Gap Losses (Silicon)
  - Tevatron can't abort beam safely
  - The counter actually measures loss in abort gap, but not current in AG.

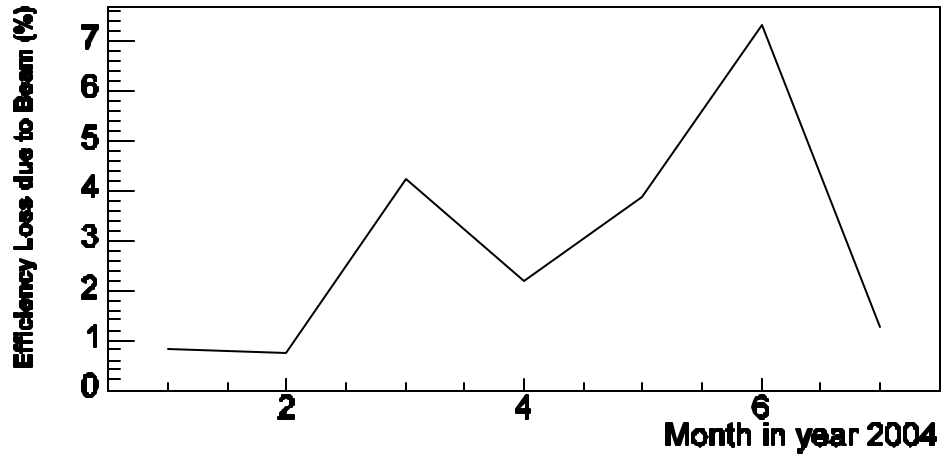




(1) Beam Loss

- Beginning of this year (Jan, Feb)
  - <1% efficiency loss due to beam
- March → June
  - 3 ~ 7% efficiency loss
  - Big improvement in initial luminosity
- July
  - Back to ~1% level
  - Big thanks to AD for their work
- Improvement:
  - Change in scraping procedure
  - Turn off CLC while re-scraping
  - New abort gap current counter (not abort gap loss counter) is under commissioning





(2) Downtime

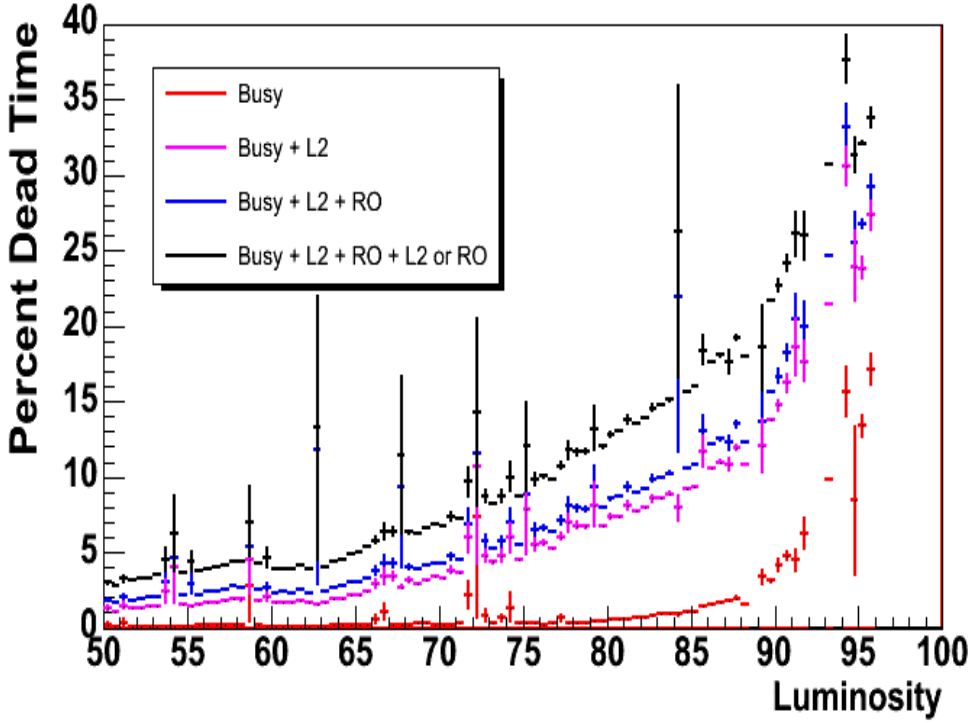
- Level 3/Evb
  - Very well covered by experts
  - Largest source of down time of this year
  - Complicated system (and instruction)
  - Training shift crew (DAQ Ace)
- SVX DAQ / HV
  - SRC problem (sometimes takes long time to recover)
  - HV trip at high luminosity (being more frequently)
- TDCs
  - Frequent problem after access, power outage
  - Availability of experts
  - TDC upgrade may resolve the problem
- Level1 / Level 2
  - Level 2 alpha processor trouble
  - L2 upgrade may resolve the problem
- Trigger Table
  - Testing trigger table/hardware
- SMXR
  - Calibration failure of plug SMXR

Year 2004 ($285 pb^{-1}$)

Category	Group	Total Lost Lu: pb^{-1})$^{-1}$
Beam Loss		**~10**
CDF Downtime		**~30**
EVB	DAQ	2.63
SVX DAQ	DAQ	2.60
TRIGLVL3	TRIGGER	2.47
SVX HV	HV	1.86
SOLENOID	MAGNETS	1.62
TDCs	DAQ	1.51
STARTUP	DAQ	1.37
TRIGLVL2	TRIGGER	1.21
TRIGTABL	TRIGGER	1.18
TRIGLVL1	TRIGGER	1.07
SMXR	DAQ	1.00
Intra-Run Dead Time		**~28.**

(3) DAQ Deadtime

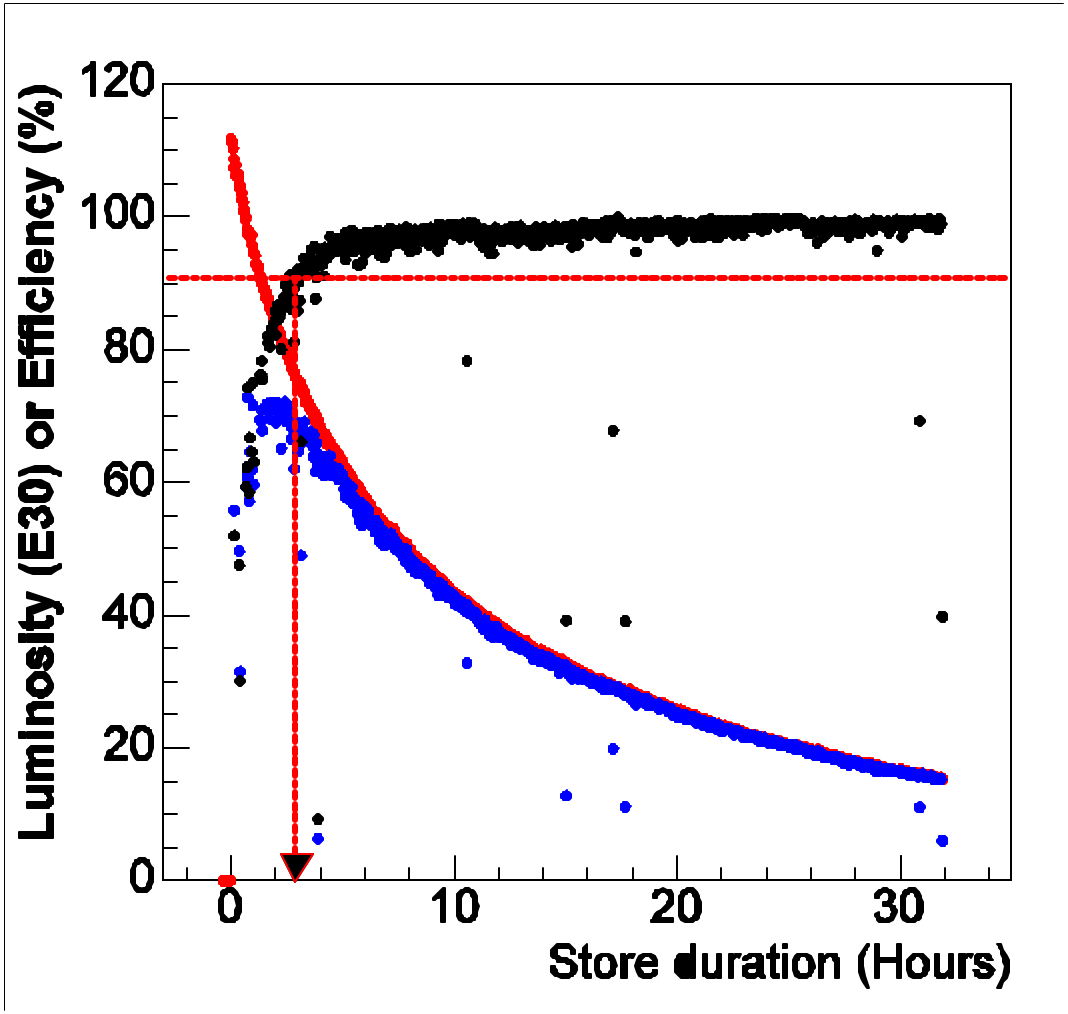
- Current System Limitation
  - L1: 28 kHz (L2 processing time)
  - L2: 400 Hz (Evb, TDC readout)
  - L3: 90 Hz (CSL: 20 Mbyte/sec)
- DAQ deadtime can be reduced
  - Improve trigger hardware/software
- Big Improvement past 2 years
  - 2002: 6kHz / 240 Hz / 30 Hz
  - 2003: 18kHz / 250 Hz / 75 Hz
  - 2004: 28kHz / 400 Hz / 90 Hz
- DAQ deadtime is adjustable
  - Trigger table (Kevin's talk)
  - PHYSICS_2_05_v11
- At L=100e30, current trigger table tries to run (if no deadtime)
  - L1: 50 kHz (limit 28 kHz)
  - L2: 700 Hz (limit 400 Hz)
  - L3: 140 Hz (limit 90 Hz)



- 50% DAQ deadtime at L=100E30
  - Need hard cut on some physics (track)
  - Run IIb DAQ upgrade awaits (Pat's talk)

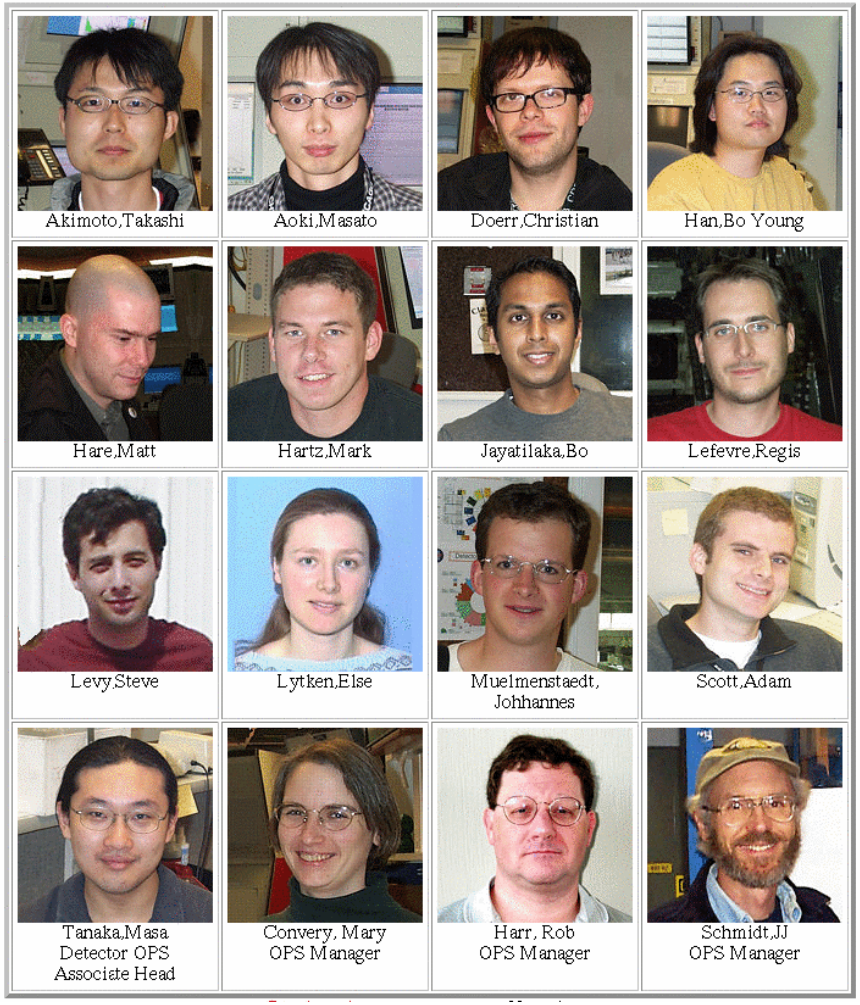
(3) DAQ Deadtime

- Luminosity profile for store 3671
  - Record Luminosity store
- Luminosity drops so quickly
  - CDF is >90% alive after 3 hours
  - Integrate ~1.0 out of 4.5 pb^{-1}
  - Store average: 5~10%
  - It is still the single largest source of the CDF efficiency loss for this month
- Improving the Luminosity lifetime is one of main goal for AD
  - Then DAQ deadtime will be more significant for CDF efficiency
  - On the other hand, trigger table will be easier to maintain



A Big Thanks

- Rainer and William stepping down as Si SPL's
  - Critical role in CDF operation
  - Welcome Rong-Shang and Petra
- JJ, Mary, and Rob Harr ending soon
  - CDF can't run without their effort
  - We are looking for new Ops managers starting after shutdown
- Current Aces finishing soon
  - Core of daily operation
- All the experts who are "living" in the CDF control room.



Summary

- Tevatron
  - Achieved record initial luminosity: 113.3e30
  - 285 pb^{-1} delivered Luminosity since Jan/2004
  - Big improvement on beam condition past 1 month
    - Big help for CDF data taking efficiency
- CDF
  - Biggest concern of the year: COT aging (It's gone now)
  - Past 1 month: 83% on tape, 76% good Run with Silicon
    - We want to achieve 90% (I'm not betting this, though)
  - Main source of CDF downtime: L3, SVX, TDC
  - Need hard cut on physics to reduce DAQ deadtime at high luminosity
    - Run IIB DAQ upgrade (EVB, CSL, L2, XFT, etc) definitely helps
  - More feedback from Offline and Physics side is needed
    - Improves the Data quality (which doesn't show up in the data taking efficiency)
    - Example: how the COT problem found